Picking Holes

I-DEAS® Tutorials: Milling Projects and Turning Projects

You define the holes to be machined in two steps. First you pick the geometry that represents the holes on the part. Then you define the order in which they're machined.

You could pick holes one by one to define their order. However, for a part with a lot of holes, manually picking them could be time consuming. In this tutorial, you'll learn techniques for quickly picking and ordering holes.

Learn how to:

- order holes by their axis position
- order holes by the shortest distance
- select holes with the master hole list

Before you begin...

Prerequisite tutorials:

- all tutorials under the Modeling Fundamentals menu
- Introduction to Generative Machining
- Building a Setup Assembly
- Generating In-process Stock and Checking Validity
- Working with Tools and Tool Catalogs

The file you need for this tutorial is distributed with the product. You must copy it into your local directory.

Move to the local directory where you want to copy the file. Then:

In UNIX:

cp $SDRC_INSTL/examples/nc/ tut_holemaking.arc .

In Windows:

copy %SDRC_INSTL%\examples\nc\ tut_holemaking.arc .

If you can't copy the file, you may have to set up the variable needed to copy from the I–DEAS installation.

. sdrc_oadev

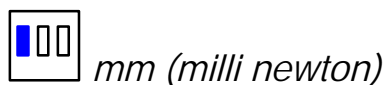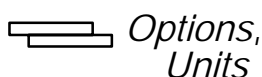If you can't access the file, contact your system administrator. The file may not be installed.

If you did not start I-DEAS with a new (empty) model file, open a new one now and name it holes.
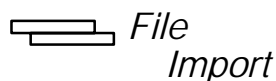
File
   Open

Model File Name: holes
   OK

Make sure you're in the following application and task:

Application: Manufacturing

Task: Generative Machining

Set your units to millimeters.

Options,
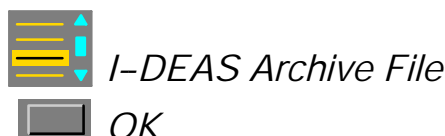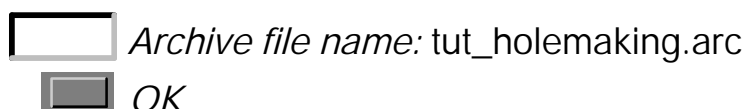   *Units*

mm (milli newton)

Import the archive file that contains the parts and tools that you need to complete this tutorial. Importing an archive file can take several minutes. Be patient.

File
    Import

Import Selections form

I–DEAS Archive File

OK

File Name Input form

Archive file name: tut_holemaking.arc

OK

The Manufacturing application quits, an informational message is displayed (the message will dismiss automatically), and the archive file is imported.

Import Archive File Status

Check *I-DEAS List*.

Be sure to check the List region to be sure that the parts imported properly.

Dismiss

A second informational message is displayed (the message will dismiss automatically) and the Manufacturing application starts.

Confirm SAVE

       [button] *No*

If you've toggled on *Automatically save after Library and Catalog operations* in *Options*, *Preferences*, *Data Management*, the software will save your model file after you copy the parts.

NC Job Create form

       [field] *Job Name*: Holemaking

       [button] *OK*

Add the part to the job.

       [icon] *Get*

       [icon] *From Bin/Library*

Select Part/Assembly form

       [list] tut_holemaking

       [button] *OK*

Hint
Use F1, F2, and F3 to adjust your view of the part.

Move the part to the global space coordinate system. The global space coordinate system acts as the origin, or program zero, of the job. In later tutorials, you'll learn how to define a machine instance and specify indexing.
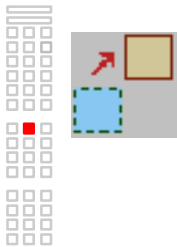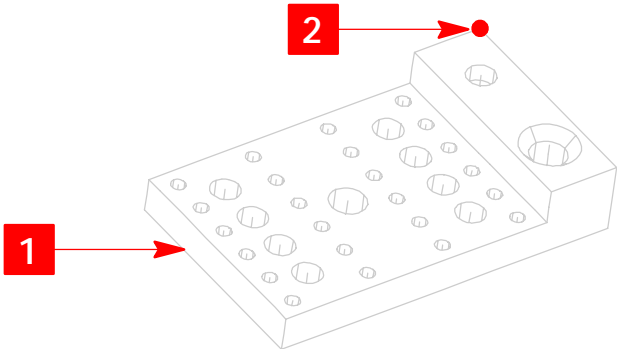
1 anywhere on the part

Move To

2 V25

Key In

Check *I-DEAS Prompt*.

Point to move to: 0, 0, 0

Recovery Point

⬜ *File*
    Save

Warning!
If you're prompted by I-DEAS to save your model file, respond:

▭ *No*

Save only when the tutorial instructions tell you to—not when I-DEAS prompts for a save.

If you make a mistake at any time between saves and cannot recover, reopen your model file to the last save and start over from that point.

Hint
To reopen your model file to the previous save, press Control-Z.

In the next few steps, you'll order the selected holes by their axis position. The axis position defines the order based on the position of the holes along the X and Y axes.

You define primary and secondary axes to determine the start hole and the order of the succeeding holes. You can think of the axes as ordering the holes by their positions in rows and columns. The primary axis determines whether the holes are first ordered by row or by column.

You'll also enter a tolerance for selecting the holes along the axes.

What: Modify the opgroup and create an operation.

How:
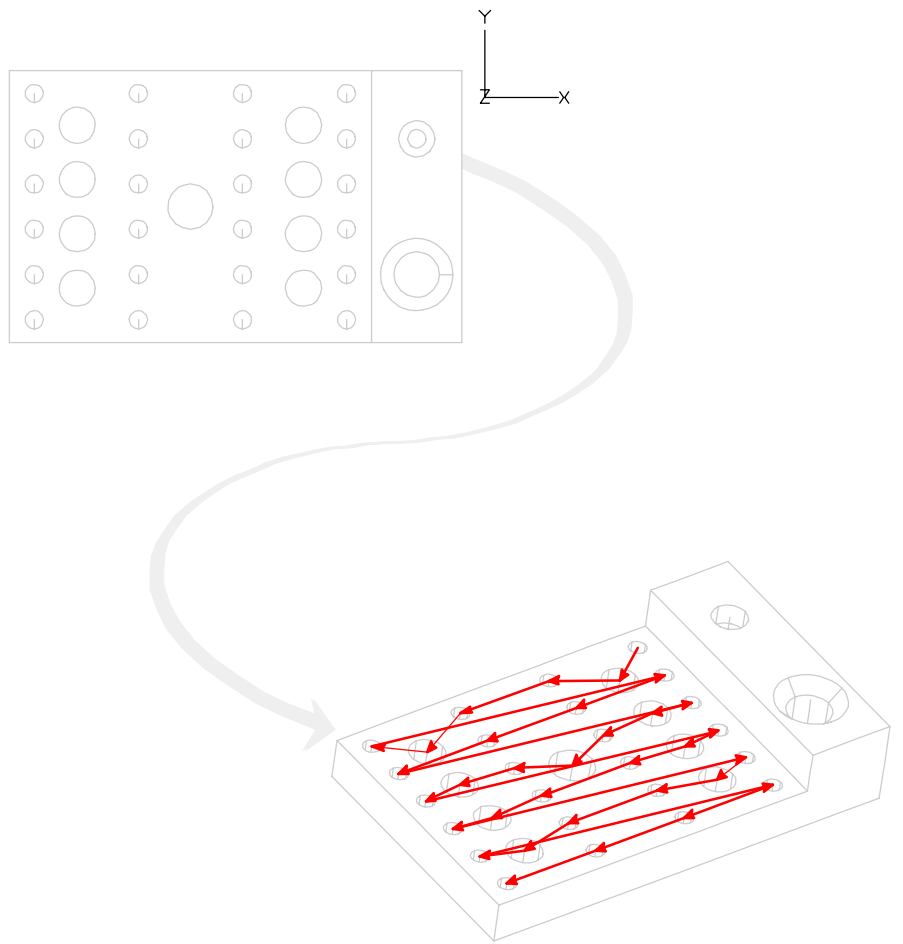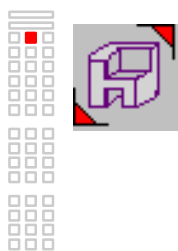
NC Job Planning form

 OpGroup 1

OpGroup Specification form

 Name: Drill Hole Patterns

Operation Selection form

 Category: Hole Making

 Type: Center Drill

 Create

 Don't close the Operation Specification form.

What: Pick the surface that contains all the holes to be machined.

How:

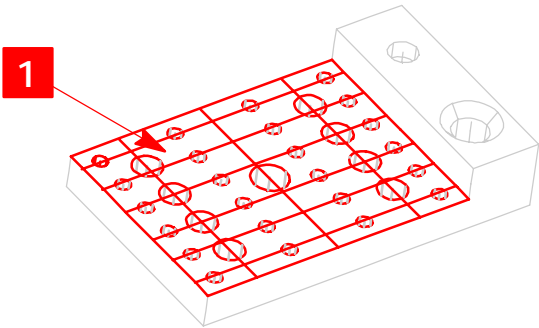## Operation Specification form

Name: Center Drill All

Hole Selection Option

Hole Selection Options form

On Surfaces—On


🚫 Don't close the Hole Machining Order form.

What: Order the holes by their axis position.

How: As you change the settings on the Hole Machining Order form, look at the direction of the arrows as they change on the part. The green arrows indicate both the order in which to machine the holes and the tool axis direction in relation to the holes.

Also note the changes in the order of the holes before and after you enter 20mm in *Band Width*. *Band Width* acts as a tolerance for selecting the holes along the axes.

Hole Machining Order form

Order: *Axis Position*

–X (first menu)

–Y (second menu)

Band Width: 20

OK
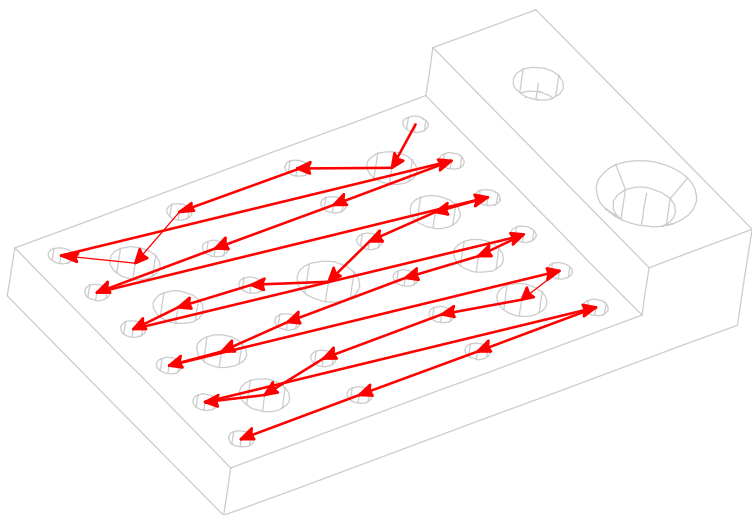
Don't close the Operation Specification form.

What: Create a center drill.

How:

Operation Specification form

Cutting Tool Specification—Drill form

[   ] *Identifier*: Number 4 Center Drill

Press the Tab key to move to the next field.

I-DEAS Warning

[ ] *OK*

[   ] *Description*: HSS 7.94mm x 3.18mm tip (5/16″ x 1/8″)

[   ] *Style*: Double Dia

[   ] *Minor Diameter*: 3.8

[   ] *Minor Depth*: 3.18

[   ] *Transition Angle*: 60

[ ] *OK*

🚫 Don't close the Operation Specification form.

What: Define the depth to cut the holes. The point depth specifies the depth of the hole plus the drill point depth as the total cutting distance.

How:

Operation Specification form

Machining Parameters: Cut form

◆ *Point Depth* (turn on)

| | *Point Depth*: 7

▭ *Cut...*
   Other Parameters

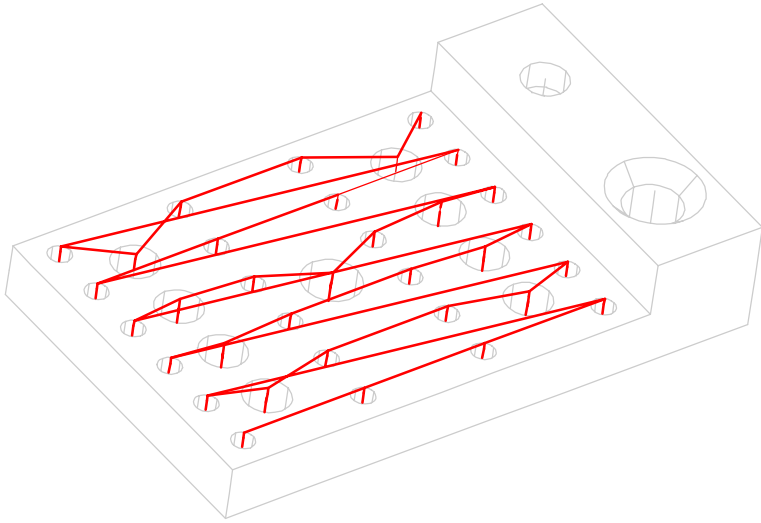◆ Retract to Maximum Z plus Clearance (turn on)

▭ *OK*

🚫 Don't close the Operation Specification form.

What: Generate the toolpath.

How:

Operation Specification form

If your toolpath appears drastically different, modify the operation and check the order of the selected holes.
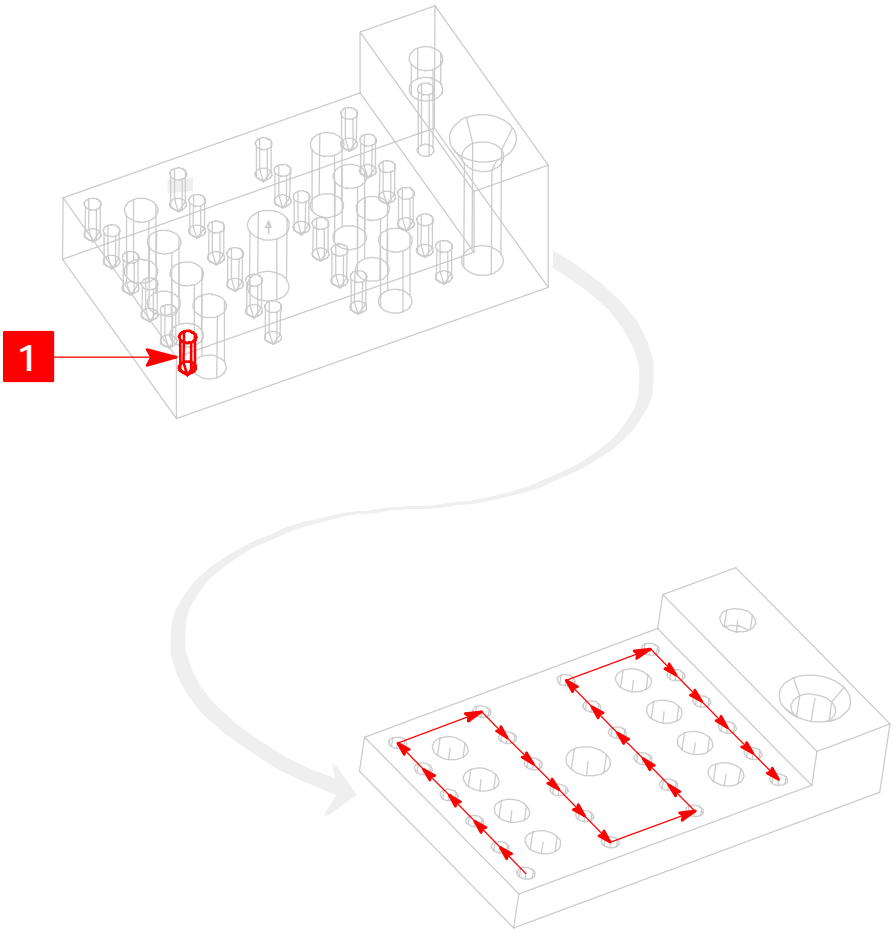
Recovery Point

File
  Save

For the next operation, you'll order the selected holes by the shortest distance. After you pick a start hole, the software calculates the quickest route to machine the selected holes.
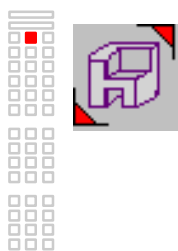
You'll also learn how to select the holes by their specific diameters.

1 start hole

What: Create a drill operation.

How:

NC Job Planning form

 Drill Hole Patterns

OpGroup Specification form

 Deselect *Center Drill All* by pressing the Control key and selecting *Center Drill All.*

Operation Selection form

 Category: Hole Making

 Type: Drill

 Create

 Don't close the Operation Specification form.

What: Pick the holes by a specific size—20mm.

How:

Operation Specification form

Name: Drill 20mm Dia Holes

Hole Machining Order form

Deselect All

Hole Selection Option

Hole Selection Options form

Matching Diameter

Same Diameter Size: 20

OK

Highlight Selection

🚫 Don't close the Hole Machining Order form.

What: Pick a start hole to order the holes by the shortest distance. You also remove an unwanted hole from your selection order.
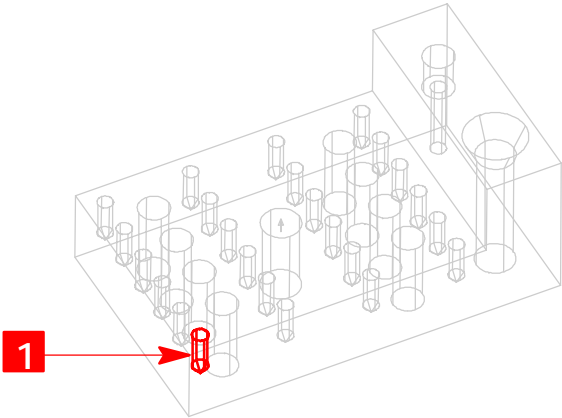
How:

Hole Machining Order form

Order: Shortest Distance

Start Hole

1 *CP19*

CP118

Things to notice

After you delete CP120, the *Order* menu switches to *User Defined*. You can use *User Defined* to modify the order of individual or multiple holes simultaneously. Before closing the Hole Machining Order form, view the final result on the next page.
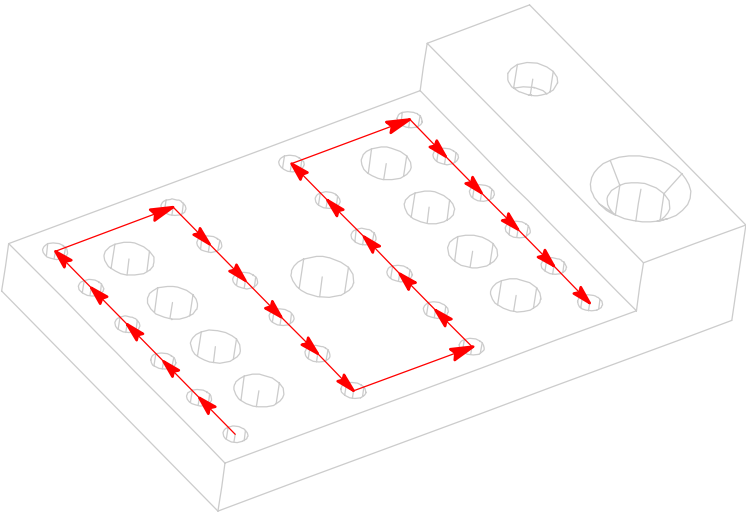
OK

Don't close the Operation Specification form.

Result

What: Create a 20mm drill.

How:

Operation Specification form

Cutting Tool Specification—Drill form

       Identifier: 20mm Standard Drill

Press the Tab key to move to the next field.

I-DEAS Warning

     OK

       Description: HSS 20mm Twist Drill

       Shank Diameter: 20

       Cutter Diameter: 20

     OK

🚫 Don't close the Operation Specification form.

What: Define the depth to drill the hole by measuring the distance of the end points.

How:

Operation Specification form

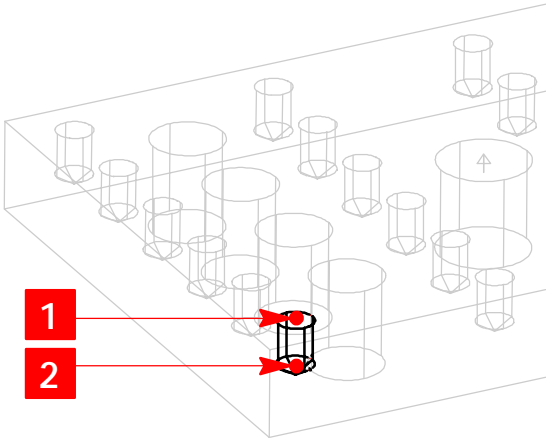## Machining Parameters form

 Hole Depth (turn on)

 Measure (next to *Hole Depth*)

1 *CP19*

2 *CP20*

👀 Read the I-DEAS List region to ensure that D1 equals 25mm. Also, watch the I-DEAS Prompt region to confirm the selection of the points.

 (twice)

🚫 Don't close the Operation Specification form.

    Cut...
       Other Parameters

    Retract to User Clearance (turn on)

    OK
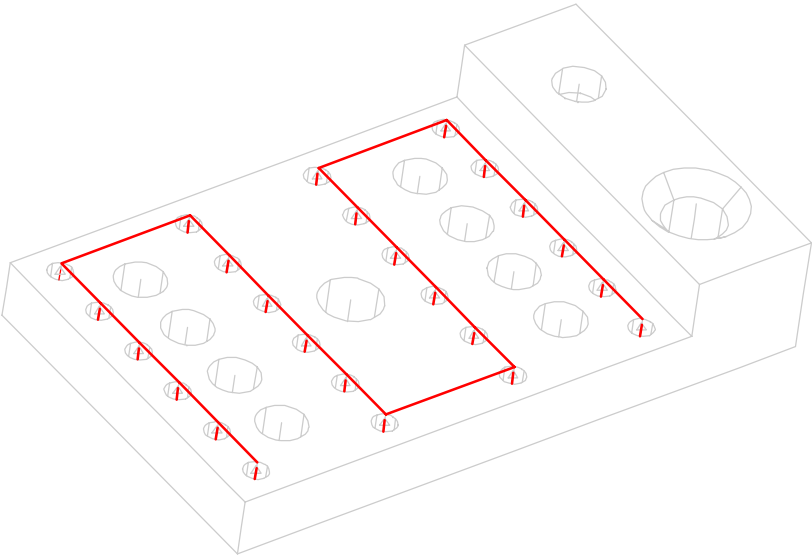
Don't close the Operation Specification form.
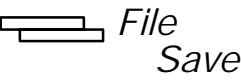
What: Generate the toolpath.

How:

Operation Specification form

Optional Animate the toolpath.

Recovery Point

 File
      Save

A master hole list lets you organize all of the holes in the current setup and output some or all of them to a hole making operation.

In the next few steps, you'll populate the master hole list with all of the holes in the current setup. Then you'll use the master hole list filter functions to select only those holes with a diameter of 40mm and a depth of 50mm.

Finally, you'll output the selected holes to an operation.
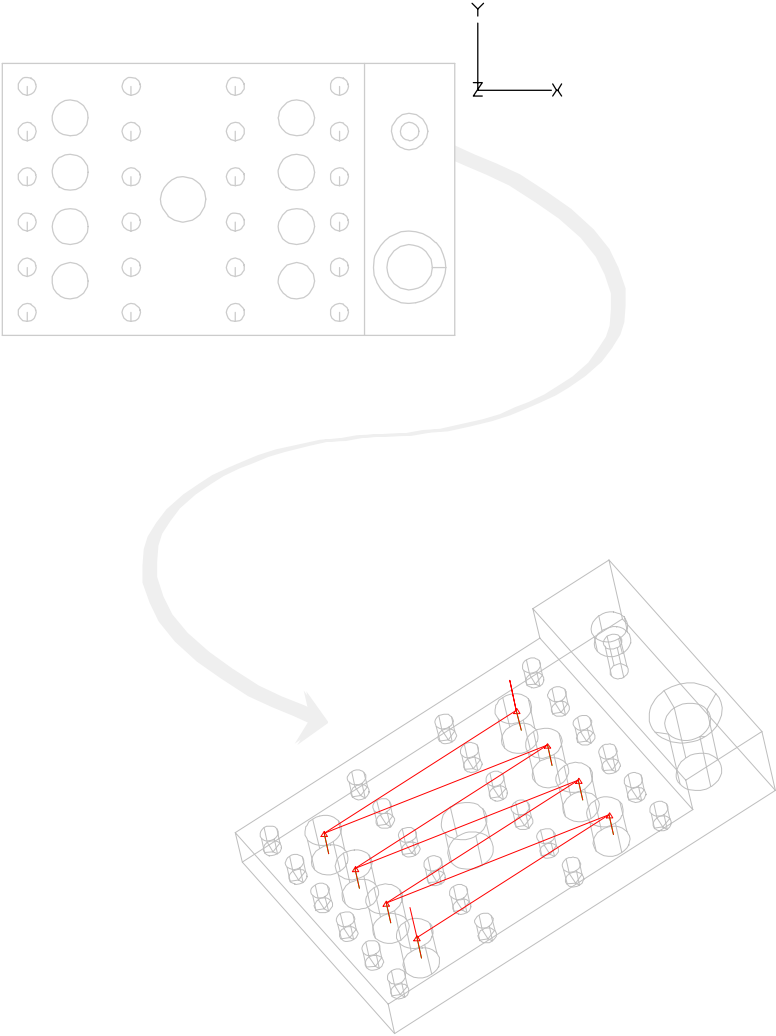
What: Modify the opgroup and create an operation.

How:
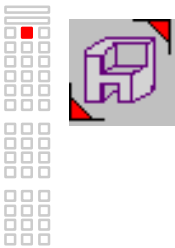
NC Job Planning form

Drill Hole Patterns

OpGroup Specification form

Deselect *Drill 20mm Dia Holes* by pressing the Control key and selecting *Drill 20mm Dia Holes*.

Operation Selection form

Category: *Hole Making*

Type: *Drill*

Create

Don't close the Operation Specification form.

What: Populate the master hole list with all holes in the current setup.

How:

Operation Specification form

Name: Drill 40mm Dia Holes

Hole Machining Order form

From Master Hole List

Master Hole List form

Don't close the Master Hole List form.

What: Filter the list to display only those holes with a 40mm diameter and a 50mm depth.

How:

Master Hole List form

Master Hole List Filter form

 Diameter

Equal: 40.00

 Diameter
      Depth

Equal: 50.00

 Dismiss

Don't close the Master Hole List form.

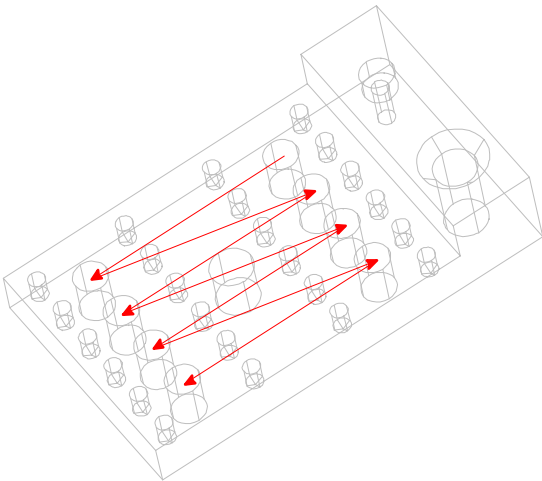**What:** Output the holes to the hole making operation.

How:

 Highlight all of the hole records in the list.

Hint
Select the first hole record in the list. Then Shift–pick the last record in the list. All records in between are also selected.

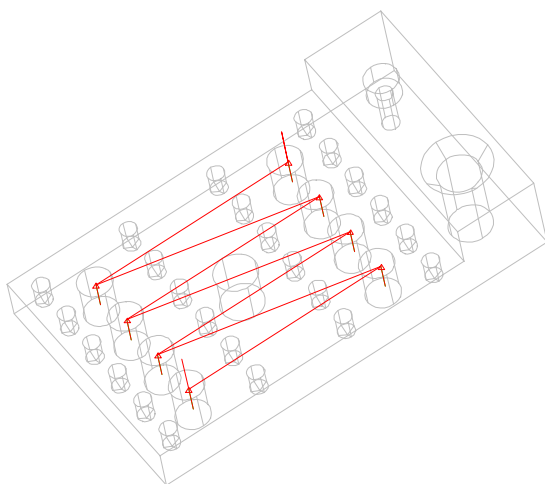

Hole Machining Order form

 OK

What: Generate the toolpath.

How:

Operation Specification form

Optional Animate the toolpath.

Recovery Point

 File
         Save

Warning!
Don't delete this model file once you're finished. You'll use this model file and job in the next tutorial.

Tutorial wrap-up

You've completed the Picking Holes tutorial.